NOAA REPORT

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Floyd Knocks Out Forecast Office, But Forecasters Carry On

Floyd Floods U.S. East Coast

Richard Curry/NOAA

Flooding from Floyd closes Highway 460 leading to the Wakefield, Va., forecast office.

—Robert Chartuk

When Hurricane Floyd drenched the Eastern Seaboard in September, causing massive flooding and widespread misery, National Weather Service employees faced the same challenges as their neighbors: boarding up homes, moving possessions out of harm's way and making certain their families were safe and secure.

But forecasters also had another responsibility—staying on the job to keep the public abreast of the storm's every move.

As Floyd approached landfall on Sept. 16, Weather Service forecasts kept an anxious nation on alert, allowing coastal residents to prepare for the worst.

President Clinton cut short a foreign visit and returned home as Floyd approached, governors declared disaster areas even before the storm hit land and thousands abandoned the coast in what became the largest peacetime evacuation in U.S. history.

At one point, Floyd weighed in just below category 5 in strength, potentially one of the most powerful hurricanes ever to threaten the mainland.

At 600 miles across, Floyd was huge. From space, the NOAA satellite images were ominous—swirling bands of energy with a menacing eye.

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"NOAA Scientist" Makes TV Debut

Television viewers have grown accustomed to seeing real-life NOAA scientists on television newscasts and documentaries. But on Nov. 5, a "NOAA scientist" will make her theatrical debut before a national television audience.

On that evening, viewers tuned to United Paramount Network's two-hour movie "Avalon—Beyond the Abyss" will see a fictional NOAA scientist helping a team of deep ocean researchers battle an environmental disaster of epic proportions. The movie is a pilot for a possible tv series about ocean research and adventure.

Avalon star and executive producer Parker Stevenson portrays

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Saeed Adyani/Waterworks

Actress Samantha Smith portrays fictional NOAA scientist Hannah Nygaard in the made-for-television movie "Avalon—Beyond the Abyss," premiering Nov. 5.

Avalon

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U.S. Navy commander John Alden, who founds the fictional Abyss Institute based on Catalina Island near the town of Avalon.

Alden leads a team that is formed to investigate the mysterious implosion of an island and stop a harmful algal bloom that threatens the entire Gulf of Mexico and beyond.

The NOAA character, Dr. Hannah Nygaard, played by actress Samantha Smith, began as a minor role. But as the environmental science aspects of the story developed, the role grew in both importance and time on-screen, according to Dan Dewell, the NOAA public affairs specialist who coordinated the project.

While the plot may be fantastic, the producers worked with NOAA Public Affairs to develop an interesting story that can also help educate viewers about the oceans.

"It's a science-fiction tale, and that allows you to stretch the truth to play along with the story. But the environmental problems faced by the team in the movie are rooted in science fact and illustrate problems that NOAA faces every day," Dewell said. "This project was a good opportunity to educate the public about real world problems in an entertaining and exciting story," he said.

"We really appreciate NOAA's help," Stevenson said. "This is a story about oceanographic research and environmental science, and NOAA is the leading entity in this field. We needed their help in making the story accurate and credible. The movie wouldn't have been possible without the help of NOAA, the Navy and the Coast Guard," he said.

The NOAA Ship *McArthur* is also mentioned and appears briefly in the movie.

Aviation Weather, Training Centers Open

—Susan Harrison

Nearly 300 people joined NOAA Chief Financial Officer Paul Roberts, National Weather Service Deputy Director John Jones and National Centers for Environmental Prediction Director Louis Uccellini to celebrate a milestone in Weather Service history Sept. 23.

Under a cloudless Kansas City sky, the new building housing the Aviation Weather Center and National Training Center were officially dedicated.

Richard McNalty/NOAA
A weather balloon launch opens centers.

Kansas City is a hub for Weather Service operations. Not only is it home to the two centers, it is the headquarters for the National Weather Service's Central Region, which manages forecast operations in 14 states, the National Reconditioning Center and the National Logistics Supply Center.

The Aviation Weather Center works around the clock to save lives, protect property and bolster the economic activity of the nation's airspace.

As the nation's primary producer of national and international en route aviation warnings and forecasts, the center utilizes a national network of radar, satellites, interactive computers and communications systems.

Data from each of these sources are integrated to form a coherent, consistent picture of the atmosphere, resulting in better watches, warnings and forecasts.

During the dedication, Aviation Weather Center Director David Rodenhuis accepted the Edgar G. Gorrell Award, which is presented annually by the Air Transport Association for outstanding contributions toward the improvement of weather analysis, forecasting or the dispatching of airline aircraft, thereby enhancing the reliability of and safety of air transportation.

Rodenhuis recognized Sharon Ranjus, an artist whose oil painting depicting aviation weather won a competition held among members of the American Society of Aviation Artists. Her painting will be displayed at the center for the next year.

At the Training Center, the focus is on preparing forecasters to put critical information to work for the safety of all Americans and the economy of the nation. Twelve classrooms and new laboratories provide hands-on training for all National Weather Service systems.

The center has just completed training personnel of all 121 weather stations and 13 river forecast centers on a specialized hydrologic forecasting system. Next year the center will host seminars in such areas as flood forecasting.

NOAA Designates Two New Estuarine Research Reserves

—Theresa Shearer

Two new estuarine reserves have been added to NOAA's National Estuarine Research Reserve System.

The Grand Bay National Estuarine Research Reserve in Mississippi includes 18,000 acres of coastal bay, saltwater marshes, maritime pine forest, pine savanna and pitcher plant bogs.

The Guana Tolomato Matanzas National Estuarine Research Reserve in Florida adds 55,000 acres of publicly-owned tidal wetlands, estuarine lagoons, uplands and offshore seas to the national system.

The National Estuarine Research Reserve System is a network of protected areas established to improve the health of the nation's estuaries and coastal habitats by developing and providing information that promotes informed resource management.

The system was created by the Coastal Zone Management Act of 1972 to augment the federal coastal zone management program, which is dedicated to comprehensive, sustainable management of the nation's coasts.

NOAA's National Ocean Service administers the National Estuarine Research Reserve System, but each reserve is operated by state agencies.

"It's remarkable how quickly we got through the designation process. Much of this is attributable to the contributions of multiple partners all along the way," said Peter Hoar, acting manager of the Grand Bay National Estuarine Research Reserve. "This accomplishment says a lot for the reserve and for its future endeavors."

Gordon Gunter Returns to Service

The NOAA Ship *Gordon Gunter* returned to service in September after completing six months of modifications and conversions that will enable it to perform a wide variety of oceanographic and fisheries-related research in the Gulf of Mexico, Atlantic Ocean and Caribbean Sea.

"These enhancements will improve the ability of NOAA Fisheries to collect high-quality data throughout a greater range of geography and sea conditions in the Gulf and South Atlantic," said Penny Dalton, director of NOAA's National Marine Fisheries Service.

The conversion was performed for less than $5 million by Boland Marine & Manufacturing Company Inc. of New Orleans, La., at its facility in Gretna, La.

Gunter replaces the recently decommissioned *Chapman*, which served the Gulf community for 18 years, but had exceeded its useful life expectancy.

The 224-foot *Gunter* was built in 1990 as *USNS Relentless* by Halter Marine, Inc., of Moss Point, Miss., and designed for U.S. Navy ocean surveillance missions.

The Navy transferred the T-AGOS 13 class ship to NOAA in early 1998.

The ship was re-commissioned by Secretary of Commerce William M. Daley in August 1998 as *Gordon Gunter*, in honor of Dr. Gordon Gunter, a noted marine biologist who was a leader in establishing marine scientific studies in the Gulf area.

The conversion to a biological oceanographic research vessel included the addition of a stern trawl ramp and handling gear and nine deck and oceanographic winches, plus 1,490 square feet of dedicated laboratory space.

The ship also now boasts a new wet lab, complete with a conveyor belt to deliver samples from the working deck to the protected environment of the lab, a versatile dry lab, a hydro/chemistry lab, a computer lab and an electronics lab.

The ship has completed sea trials and is back in service tracking marine mammals, collecting plankton and conducting trawl samples in the Gulf of Mexico.

—Jeanne Kouhestani

NOAA file photo

"Gordon Gunter is a more capable and very economical substitute for the former Chapman. The gains of an originally designed fisheries research vessel will be apparent," according to Gunter's commanding officer, Cdr. Craig McLean.

Focus On...

National Estuaries Day

—Theresa Shearer

Each year in early October, National Estuarine Research Reserve sites across the country celebrate National Estuaries Day to highlight the importance of America's estuaries and provide the public with an opportunity to visit these coastal bays, sounds, marshes and lagoons.

"In addition to heightening our understanding of estuaries as vital components to the world's ecosystem, National Estuaries Day is an opportunity for the American public to enjoy the beauty and adventure of the nation's reserve system," said Laurie McGilvray, acting chief of the Estuarine Reserves Division of NOAA's National Ocean Service. "We want to emphasize that the health of our estuaries is important to our economy and the rich marine life that lives there," she said.

National Estuaries Day was intended to educated the public, but it has also strengthened the National Estuarine Research Reserve System's partnership with EPA's National Estuary Program and the Center for Marine Conservation.

On the local level, many of the National Estuary Programs and National Estuarine Research Reserves co-sponsored National Estuaries Day activities. Here are some highlights:

Craig Cornu/NOAA

Participants in South Slough Estuarine Research Reserve's Pintail Parade tossed numbered "ducks" into Winchester Creek and watched them ride the tide to the finish line, symbolizing the restoration of marsh habitat for migratory waterfowl.

Laurie McGilvray/NOAA

Children learn about wetland habitats using an interactive computer display of Jug Bay ecology.

The Chesapeake Bay, Va., National Estuarine Research Reserve had a special canoe trip, poster session and lectures on National Estuaries Day.

The Delaware National Estuarine Research Reserve created a mock dune and tidal marsh display, which included live plants, grass, crabs and mussels.

Old Woman Creek National Estuarine Research Reserve hosted 350 bicyclists during the 1999 tour along the south shore of Lake Erie. At the same time, more than 400 birders attended field trips at the reserve during the 1999 Midwest Birding Symposium.

South Slough National Estuarine Research Reserve in Oregon celebrated its 25th anniversary by hosting individuals who were instrumental in the reserve's designation, unveiled a new art exhibit, held a potluck dinner and barbecue on the lawn and provided the public with an opportunity to learn about the reserve's research, education and stewardship projects.

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Reserve Highlights

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ACE Basin National Estuarine Research Reserve sponsored "A Coastal Adventure" on National Estuaries Day. Approximately 50 participants learned about the ACE Basin estuarine system and its importance to the economy and wildlife of South Carolina.

Many of the participants joined a marine biologist aboard a 50 foot research vessel and discovered the estuarine species commonly found in South Carolina's estuaries. A few folks took a leisurely ten-mile bike ride through the center of the reserve with a biologist and explored the rich diversity of flora and fauna in one of the East Coast's largest bio-reserves.

Guided by a marine educator, other participants chose to pull a 30-foot seine net through the surf and capture small fish, crabs and other animals. After returning these creatures to the water, they explored the reserve's beach to learn more about the seashells of South Carolina's coast.

Janice McDonnell/Jacques Cousteau NERR

Jacques Cousteau research reserve technician Sharon O'Donnell displays specimens from the reserve's wet lab.

Jacques Cousteau National Estuarine Research Reserve sponsored guided tours of the Rutgers University Marine Field Station, in Brunswick, N.J.

Matt Menashes/NOAA

Middle school students visiting the Chesapeake Bay, Va., estuarine reserve examine replicas of animals that live in estuaries.

The Jug Bay Wetlands Sanctuary, part of the Chesapeake Bay, Md., National Estuarine Research Reserve's Jug Bay Component, officially opened its Interactive Wetlands Education Project.

Great Bay National Estuarine Research Reserve in New Hampshire celebrated its 10th anniversary with a 5K road race and recognized individuals as "Great Bay Treasures." Other activities included the burial of two time capsules, storytelling, music, educational displays, birdwatching and a salt marsh haying demonstration. A formal agreement with Northern Ireland and the Republic of Ireland was signed by a visiting Irish delegation—designating, for the first time, a sister estuarine research reserve in that country and making the National Estuarine Research Reserve System's influence international in scope.

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Days before landfall, the National Hurricane Center in Miami was abuzz with activity. Dozens of camera crews rolled tape on the center's advisories and predictions. Director Jerry Jarrell and Deputy Director Max Mayfield worked around the clock, giving live interviews until their voices went hoarse. Media calls came in from almost every state of the union and as far away as New Zealand, England and Germany.

The hurricane was going to come ashore along the Carolinas; this much was certain. But there was another concern. Floyd's heavy rains were going to incite severe floods and flash floods many miles from the coast. Three of the nation's river forecast centers went into 24-hour operation, and forecast offices up and down the seaboard sounded the alarm.

Shaun Baines/NOAA

Flooding like this at Route 18 and Commercial Avenue in New Brunswick, N.J., Sept. 17 was repeated up and down the U.S. east coast as tropical storm Floyd swept inland.

Two days before landfall, the NOAA Public Affairs Office in Washington, D.C., put hundreds of media outlets on alert: "Hurricane prompts Weather Service caution on inland flooding...No one should be taken by surprise."

Vital storm tracking information on Floyd was provided by NOAA's Aircraft Operations Center in Tampa, Fla., and the Air Force Reserve Command, which kept an around-the-clock vigil, racking up numerous flights in the eight days Floyd prowled the Atlantic.

During one dark night, a NOAA P-3 and an Air Force WC-130 met each other in Floyd's eye. "As the P-3 passed a thousand feet below us, they turned on their bright landing lights, a welcome sight in the darkness out there," said Air Force flight meteorologist Maj. Valerie Schmid.

Data from the planes go directly by satellite link to the hurricane center, improving the forecast accuracy by 25 percent over using satellite photos alone, Schmid noted.

Even though Floyd weakened to a category 2 hurricane at landfall, its rains came hard. Doppler radar tallied up precipitation amounts, as flood forecasts and warnings streamed out.

A record 19 inches of rain fell in North Carolina, while Viriginia was hit with 18 inches. A foot or more of rain drenched other areas as the storm tracked up the coast. Streets flooded and rivers began to rise. Maryland, Delaware, New Jersey and New York—areas previously dried out from a persistent drought—were now deluged with more water than the ground could handle.

Forecaster Todd Hamill was dispatched from the Southeast River Forecast center near Atlanta to assist in Conway, S.C., an extremely tricky location to forecast due to its lowlands, swamps and various topographical anomalies.

"At first, the locals didn't think their 71-year-old flood record would be broken," said Sol Summer, chief hydrologist for the Weather Service Eastern Region. "The river was rising and the crest forecasts were way beyond what the people expected. Todd met with the city's engineering department, he went up in a helicopter and he went live on the air with the local media. In the end, the community was very grateful that we dispatched someone with Todd's expertise to help warn them about the extent of Floyd's flooding."

According to John Feldt, hydrologist in charge of the Southeast River Forecast Center, "We knew we were looking at record-breaking floods early on. We were pinpointing areas of extensive inland flooding on our maps as much as a week in advance of the rivers cresting," he said.

At the forecast office in Wakefield, Va., the scene was bleak. Highway 460, the four-lane road leading to the office, was covered in eight feet of water.

Making matters worse, the office's phone lines went dead,

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water was cut off and the office was forced to switch to emergency power.

Despite these obstacles, the Wakefield forecast area, serving southeast Virginia, northeast North Carolina and the lower Maryland Eastern Shore, did not miss a single warning or forecast.

Tony Siebers, Wakefield's meteorologist in charge, was dubbed the storm's "Iron Man" by his staff. "There were several of us who were here for 24 to 36 hours continuously during Floyd," reported science operations officer Hugh Cobb. "Tony was on the job for 48 hours straight!" When Cobb finally left the office after 36 hours, it took him eight hours just to get home.

Weather Service personnel in Wilmington, N.C., also bore the brunt of Floyd. John Purdy and family had to evacuate their Carolina Beach home and were housed in motels for days.

Access to the city was compromised by many closed roads, including I-40. Storm surges flattened numerous beach areas, including Topsail Beach, where dune sand was carried into the streets. Through it all, Purdy and his colleagues stayed on the job, keeping the office up and running.

As Floyd's heavy rains drenched the mid-Atlantic region, employees at the Mt. Holly, N.J., forecast office helped rescue a family—including an 87-year-old woman—from their home, which was being inundated with rapidly rising waters from the Raritan River.

Monitoring traffic on the National Warning System, Joe Miketta learned of the Manville, N.J., family's distress call and coordinated a rescue with the help of colleagues Art Kraus and Bill Christ. Meanwhile, Marty Ross used an Internet search engine to obtain the family's address and phone number to guide the rescuers.

In Morehead City, N.C., the forecast office lost commercial power and phone service, but continued communications with the outside world using cell phones. As the storm passed, data acquisition program manager Central Wills made his way to Greenville, N.C., to locate an over-

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Marcie Diehl/WTVJ-TV for NOAA

Several hours before Hurricane Floyd made landfall, NOAA s National Hurricane Center Deputy Director Max Mayfield (standing right) takes a moment for a group photo with members of the assembled media and NOAA staff.

Brian Ballweg for NOAA

***NOAA Commissions New Officers**. A new class of NOAA Corps officers has graduated from basic officer training at the U.S. Merchant Marine Academy in Kings Point, N.Y. Pictured left to right: Ensigns Kurt Dreflak, Angelika Messer, Kevin Werner, Jennifer Hickey, Kristie Twining, Brian Goodwin, Holly DeHart and Jason Appeler.*

Cdr. Peter J. Celone is the new commanding officer of the NOAA Ship *Albatross IV*, based in Woods Hole, Mass.

Donald Knowles is the new director of the National Marine Fisheries Service Office of Protected Resources in Silver Spring, Md.

News Briefs

The Congressional Black Caucus Foundation, Inc., has honored Rear Adm. Evelyn J. Fields with its Ralph M. Metcalfe Health, Education and Science Award.

The Office of Oceanic and Atmospheric Research has named its employees of the year: Susan A. Borda, a writer-editor with the National Sea Grant College Program in Silver Spring, Md., Stephen M. Griffies, a physical scientist with the Geophysical Fluids Dynamics Laboratory in Princeton, N.J., Lawrence Griffin, an electronics technician with the National Severe Storms Laboratory in Norman, Okla., Helen Horton, executive secretary in the Office of the Executive Director for Boulder Activities in Boulder, Colo., Cynthia L. Loitsch, a program support specialist at the Pacific Marine Environmental Laboratory in Seattle, Wash., F. Martin Ralph, a research meteorologist at the Environmental Technology Laboratory in Boulder, and Carol L. Wolf, a computer assistant with the Space Environment Laboratory in Boulder.

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run river gauge. He proceeded to take water height measurements manually every hour, and reported them back to his office and to local emergency management officials. He even posted them on a tree near the river so residents would be aware of the flood situation.

In Raleigh, N.C., meteorologist in charge Steve Harned took to the air the day after the hurricane passed to assess the flood risk along the Tar and Neuse Rivers. He discovered that a tremendous amount of water still covered the countryside and had yet to drain into the already severely flooded rivers. As flood waters peaked days after Floyd's passage, Harned's aerial observations were critical in warning the people in harm's way.

Eight to ten inches of rain caused considerable flooding as far north as western Massachusetts and Connecticut.

At the height of the storm, Weather Service hydrologist Dave Vallee shared his time between 14-hour shifts at the Taunton, Mass., forecast office and helping his wife care for a set of newborn twins at a hospital 35-miles away, while at the same time taking care of another set of twins, in their terrible twos, at home.

Dave also briefed the hospital staff, which had to deal with a loss of both electricity and phone service, and entertained a media blitz back at the office.

That the storm would bring unheard of flooding to the eastern states was no surprise.

"The Hydrometeorological Prediction Center, using global models and coordinating with the Tropical Prediction Center, provided forecasts for Floyd seven days in advance—an historic accomplishment," said Louis Uccellini, Director of the National Centers for Environmental Prediction. He noted that the center's forecasts were a crucial part of daily briefings to the Federal Emergency Management Agency, which was also kept apprised of the storm's likely path by a hurricane center liaison team that included meteorologists from local forecast offices.

"These specialized briefings certainly put the emergency management community on notice days before Floyd hit," Uccellini said.

With 71 fatalities, Floyd reaffirmed a Weather Service study showing that in recent years inland flooding from hurricanes has been more deadly than the coastal threat of storm surge.

Without all of the advanced forecasts and warnings, Floyd's toll could have been much worse.

"From the national centers to the field offices to river forecast centers, devoted public servants brought to bear tremendous resources to help blunt Floyd's impact," said National Weather Service Director Jack Kelly.

"They suffered the same hardships as their neighbors, yet placed service above their own personal safety and well being, and for that we are both grateful and proud," Kelly said.

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